for any observation during that year unless it be a leap year, in which case the index must be reset after February 28th.

Then, to find the Greenwich mean time of any observation during that year, the slide is moved until the day of the observation is at the index. The Greenwich mean time will be found to coincide with the sidereal time on the lower scales.

For the later months of the year the slide would be drawn almost out so that only a small range could be read, and this range would not include all the hours of darkness. To overcome this difficulty, another index is placed in the middle of the rule. This second index is shown in the cut; only the central section of the rule is shown. For use with this index another set of hour numbers is printed along the top of the rule, but the same sidereal scale is used with both indices.

The rule is twenty inches in length and gives the thousandths of a day correctly. A larger rule accurately made and carefully used would give the fourth place. G. W. MOFFITT.

November, 1911.

COMET NOTES.

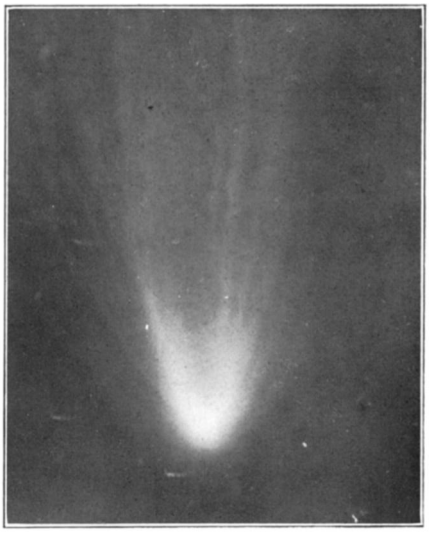
It is not often that such an abundance of cometary material offers itself for observation as has been the case during the past three months. Comet Kiess is at present far south of the equator, visible only to observers in the southern hemisphere. A new comet was discovered by QUENISSET at Juvisy on the evening of September 25th. It has been visible in a small telescope, but at no time became bright enough to be seen with the unaided eye. It is at present too far south to be observed except from the southern hemisphere. BORRELLY'S periodic comet (1905 II) has been visible in large telescopes south of the equator, and is rapidly moving within reach of observers in the northern hemisphere, but does not promise to become a naked-eye object.

Comet Beljawsky was discovered on September 29th in Russia, and independently discovered by four or five observers in America, and doubtless by a number of others in other parts of the world. Owing to its proximity to the Sun, it was at no time very favorably placed for observation; it was, however, quite a conspicuous object for a few days in the morning sky,

and again as an evening object, showing a tail eight to ten degrees in length. It diminished in brightness almost as rapidly as it had appeared, and is now visible only as a telescopic object, and out of reach of observers in the northern hemisphere. Its perihelion distance was relatively small — twenty-eight million miles,—which, together with the rather unfavorable position of its orbit plane with reference to the Earth, accounts for its sudden appearance as a conspicuous object and its equally sudden disappearance. At the time of its greatest brightness it showed beautiful envelopes about the head and a rather irregular streamer tail.

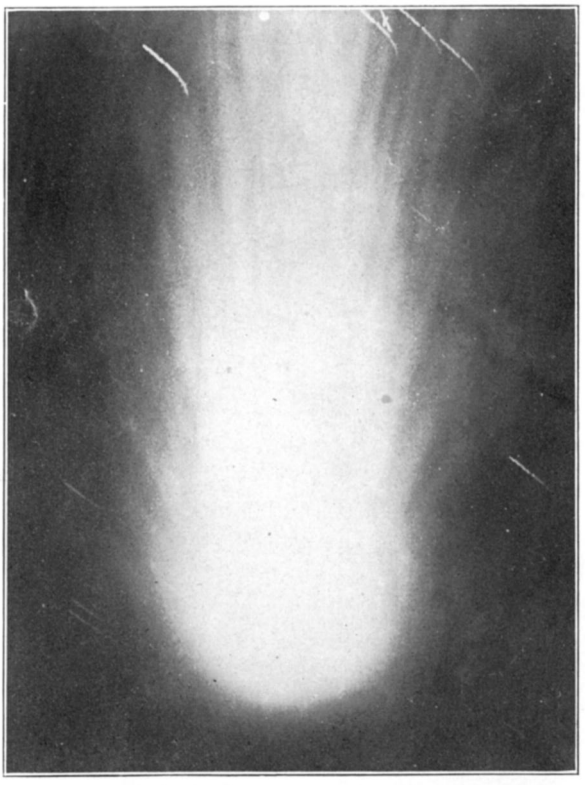
From its brightness and from its northern declination, making its observation easy, Comet Brooks easily holds first rank as the most interesting comet thus far in 1911. It was fairly conspicuous as an evening object, and for a while was both a morning and an evening object because of its northern position. Its greatest beauty was attained as a morning object as it approached perihelion, and as seen from Mt. Hamilton in the morning hours during the period from November 17th to November 24th it was a striking sight, surpassed in recent years only by Comet Halley at its best.

A series of plates of Comet Brooks was taken by Mr. C. C. KIESS with the Crocker photographic telescope, and a number of photographs have also been secured with the Crossley reflector. Several of these show very beautiful streamer effects near the head. In general, the tail was of the streamer type and relatively quiescent. It developed greater activity as it neared perihelion, however, and a number of the plates taken with portrait lenses show interesting knots and condensations. The plates of October 21st and November 4th, herewith reproduced, show the two types of tail, that of October 21st showing a broken and distorted tail with very irregular and confused condensations. A twisted effect is visible in many of the streamers on the Crossley plates, recalling similar features in Comet Morehouse, and due doubtless to the effect of carbon monoxide, the most prominent feature in the spectrum of both these comets, a substance whose presence seems to be particularly apt to cause curious, irregular, and bizarre forms of tail. Plates taken with a lantern lens on October 21st and 22d record



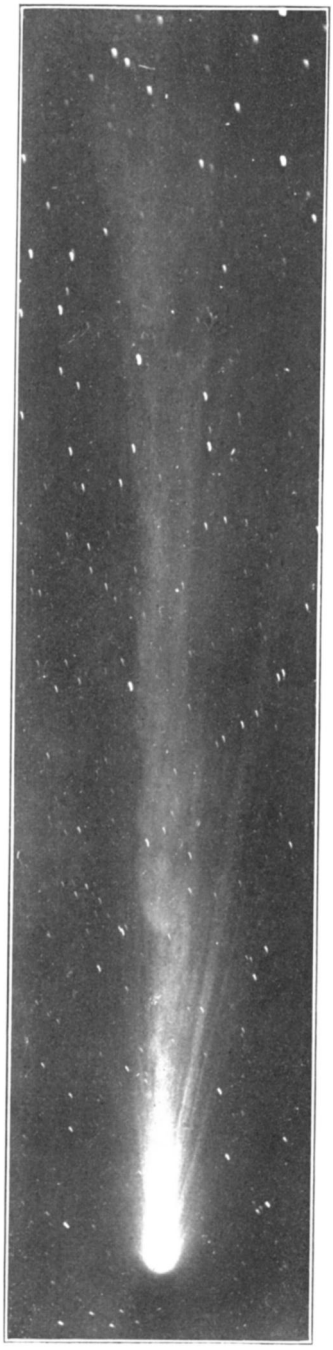
HEAD OF COMET BELJAWSKY.

1911, October 19th. Crossley reflector. Negative by H. D. CURTIS. Exposure 19 m.



HEAD OF COMET BROOKS.

1911, October 22d. Crossley reflector. Negative by H. D. CURTIS. Exposure 54 m.



1911, October 21st. Exposure 40 m.
Negative by H. D. Curtis.
Willard lens.

1911, November 4th. Exposure 1 h.
Negative by C. Ç. Kiess.
Dallmeyer lens.

Photographs of Comet Brooks, taken at the Lick Observatory.

the tail for thirty degrees or more and are strikingly alike, particularly in the presence on each of a strong, straight, southern streamer; they afford also data for the determination of the motion of the irregular masses away from the head.

H. D. CURTIS.

November, 1911.

NOTE ON THE SPECTRUM OF COMETS BROOKS AND BELJAWSKY.

A series of photographic observations of the spectrum of Brooks' Comet was made during the months of September and October, using slit spectrographs and a prismatic camera. The approach of the comet to perihelion, which occurred during the latter part of October, was marked by an increase in brightness, relatively to most of the other radiations, of the tail bands, due to the presence in the comet of carbon monoxide. These bands were conspicuous in the spectrum of Morehouse's Comet of 1908. They were comparatively faint in Brooks' early in September, but developed steadily in strength as the comet approached the Sun.

The slit spectrograms extend from the ultra-violet to the extreme red. Observations with a quartz spectrograph shows that there are no strong radiations above the cyanogen bands near λ 388. The diffused sunlight in the spectrum of the comet's head is nearly all of greater wave-length. This confirms, so far as an observation of one object of this class can confirm that of another, similar results on the spectrum of Halley's Comet, and shows that the particles which diffuse or reflect sunlight in a comet's head are larger than those which perform a similar function in the atmosphere of the Earth.

Between H and C the spectrograms record many dark solar lines, and in addition numerous bright lines, some of which show the presence in the comet of carbon, carbon monoxide, cyanogen, and sodium.

A fuller discussion of these observations will appear in the Lick Observatory Bulletins.

The plates were secured with the co-operation and assistance of Messrs. CURTIS, KEISS, WILSON, and SHEPPARD, to whom thankful acknowledgments are due.

A photograph of the spectrum of Beljawsky's Comet was secured on October 5th. A noticeable feature of the spectrum